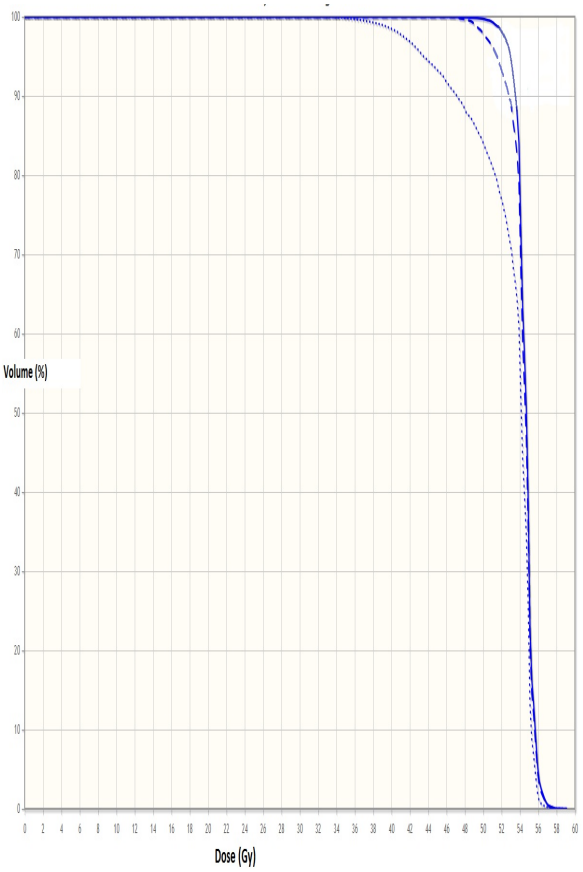

Conclusions: The accuracy of the spatial deposition of the 3D dose pattern in brain tumor radiotherapy is strongly correlated to treatment outcome and patient safety. In the hypophysis treatment simulated, the combined effect of 3 mm spatial inaccuracy in each direction can significantly alter the DVHs of the target and the organs at risk. The proposed methodology, which employs the planning-CT scans, the RStructure and RDose dicom-RT files as well as the open source software 3D-slicer, can be used for quantifying the effect of spatial errors on dose delivery accuracy in any selected treatment site and/or treatment plan. This simplified approach could be used in the appraisal of the quality and robustness of a specific clinical treatment plan or for plan intercomparison with regard to the relative sensitivity of dosimetric outcome to spatial uncertainties.

EP-1382

Hospital neutron dosimetry studied using diamond detectors

F. Manchado de Sola[1], L. Acosta[2], J.A. Dueñas[2], I. Martel[2]
[1]*Juan Ramón Jiménez Hosp & Huelva University, Medical Physics Department & Applied Physics, Huelva, Spain*
[2]*Huelva University, Applied Physics, Huelva, Spain*

Purpose/Objective: Diamond detectors are used in fundamental nuclear physics and many others fields of applied science. Its radiation hardness and electrical properties make them ideal to work under extreme conditions. The main goal of this work is to study the advantages of using diamond detectors as neutron dosimeter for both protontherapy and conventional radiotherapy accelerators.

Materials and Methods:

a) Neutron from a ^{252}Cf source:

The diamond detector was mounted inside a reaction chamber close to a ^{252}Cf source. A shielding of 3.2 mm of lead was placed between detector and source to avoid heavy products deposition.

b) Neutrons from a conventional radiotherapy accelerator:

Measurements were performed using the 15 MV photons mode at the Juan Ramón Jímenez Hospital radiotherapy accelerator. In order to minimize the photon radiation all collimators were closed and diamond detector was shielded with lead.

c) Neutron produced in a reaction scenario at a 3 MV Tandem:

The experiment took place at the Centro Nacional de Aceleradores (CNA) in Sevilla. Neutrons produced by a $^{12}C(^{2}H,n)^{13}N$ reaction were detected outside the reaction chamber by our diamond detector placed 0° off the beam axis by the target position.

Results: After 40 days non-stop measurement with the ^{252}Cf source, the expected elastic collision ramp due to elastically scattered neutrons was observed an activation peak was observed too. Similarly, our single crystal diamond detector placed alongside the radiotherapy accelerator showed the expected shape too. At the CNA Tandem, the analogous shape was obtained at the forward diamond detector. Several peaks due to charged particles at the 90° diamond detector were observed in a monitor system in vacuum. Good agreement between experimental data and simulations has been achieved.

Conclusions: Our experimental setup is ready to detect neutrons coming from different sources. Diamond detector is showing a promising behavior in neutron detection devoted to measurement at medical facilities. Simulations generated with GAMOS-GEANT4 show a good agreement with experimental data.

EP-1383

Experimental evaluation of high density ArcCHECK mode for SBRT verification

E. Montes[1], I. Modolell[1], R. De Blas[1], I. Sancho[1], J. Puxeu[1], G. Reynés[1], C. Picon[1]
[1]*ICO Hospitalet, Physics, Barcelona, Spain*

Purpose/Objective: Stereotactic body radiation therapy (SBRT) is a type of radiation therapy in which the dose is delivered to small, well-defined tumors using a high dose per fraction scheme. Our centre uses the ArcCHECK phantom manufactured by Sun Nuclear (SNC Melbourne, FL) to perform the pre-treatment verification of IMRT and VMAT plans. The ArcCHECK features a High Density (HD) measurement procedure in which the measurement resolution is doubled. The purpose of the present work is to evaluate whether this HD mode is required for pre-treatment QA of our SBRT plans.

Materials and Methods: Ten different SBRT (VMAT) plans were calculated with Varian Eclipse treatment planning system (TPS) using the analytical anisotropic algorithm (AAA version 10.0.28). The plans were made for a TrueBeam linear accelerator (Varian Medical Systems, Palo Alto, CA), with 6 MV arcs using either a Flattening Filter (FF) or a Flattening Filter-Free (FFF) configuration. The degree of modulation